

# Introduction to Genetics

Heredity =

- Biological inheritance of traits from parent to offspring

Genetics =

- Study of heredity

Gregor Mendel

- Born in 1822
- Monk who studied math and science
- Famous for contributions in genetics
  - Published his findings in 1865
  - Worked with true-breeding pea plants
  - Studied 7 traits in pea plants for at least 3 generations

| <b>Trait</b>    | <b>Parent Generation</b> | <b>Offspring</b> |
|-----------------|--------------------------|------------------|
| Plant Height    | Tall x Short             | Tall             |
| Flower Position | Axial x Terminal         | Axial            |
| Flower Color    | Purple x White           | Purple           |
| Pod Shape       | Smooth x Bumpy           | Smooth           |
| Pod Color       | Green x Yellow           | Green            |
| Seed Shape      | Round x Wrinkled         | Round            |
| Seed Color      | Yellow x Green           | Yellow           |

Did these traits blend?

- NO

# GENETICS VOCABULARY

Gene =

- Unit by which hereditary characteristics are transmitted

Allele =

- Different forms of a gene
  - Offspring get one allele from each parent

- Examples
  - Gene for height (tall versus short)
    - 2 Tall alleles = Tall
    - 2 Short alleles = Short
    - 1 Tall allele + 1 Short allele = Tall
  - Gene for seed color (yellow versus green)
    - 2 Yellow alleles = Yellow
    - 2 Green alleles = Green
    - 1 Yellow allele + 1 Green allele = Yellow

## *Dominant allele* =

- Form of a gene that is expressed when present and masks the recessive form
- Represented with a capital letter
- Examples
  - Tall plant
  - Yellow seed color

## *Recessive allele* =

- Form of a gene that is not expressed if dominant allele is also present
- Represented with a lowercase letter
- Examples
  - Short plant
  - Green seed color



**Phenotype** =

- **Ph**ysical expression of a trait in an organism
- IE- What you “see”
- Examples
  - Tall or short
  - Yellow or green seed
  - Blue or brown eyes

**Genotype** =

- **Genetic** make up of an organism
- Examples
  - TT, Tt, tt
  - YY, Yy, yy
- NOTE: Phenotypes can be produced by more than one genotype
  - TT and Tt both = tall
  - YY and Yy both = yellow seeds

### Homozygous =

- Organism with identical pair of alleles for a trait
  - Either both dominant or both recessive alleles
- “Same” “Joined together”
- Examples
  - TT, tt, YY, yy

### Heterozygous =

- Organism with mixed pair of alleles for a trait
  - One dominant and one recessive allele
- “Different” “Joined together”
- Examples
  - Tt, Yy

# PRACTICE EXAMPLES

Tall (T) is dominant over short (t)

Axial (A) is dominant over terminal (a)

Purple flowers (P) is dominant over white (p)

Write the phenotype for each.

|      |                  |
|------|------------------|
| Tt   | tall             |
| aa   | terminal         |
| PP   | purple           |
| TTpp | Tall AND white   |
| AaPp | Axial AND purple |

Tall (T) is dominant over short (t)

Axial (A) is dominant over terminal (a)

Purple flowers (P) is dominant over white (p)

Write the genotype for each.

Homozygous axial

AA

Short

tt

Heterozygous purple

Pp

Heterozygous tall AND terminal

Ttaa

Homozygous tall AND homozygous purple

TTPP